

From: [Finn, Steve](#)
To: [Yeh, Alice](#)
Cc: [Lin, Heather](#); [Illes, Robert](#)
Subject: RE: EPA Comments on SCP OU3 ISCO Pilot Test Report
Date: Friday, October 12, 2018 11:36:04 AM
Attachments: [ATT00001.txt](#)
[SCP ISCO PT Trend Plots Combined.pdf](#)

Hi Alice

As we discussed, responses to your comments are provided below and the associated trend plots are attached.

Please let us know if these responses are acceptable and if we should modify the Pilot Test report or submit this information as a supplementary letter.

Thanks very much

Steve

- A. To visually show the lateral extent of the injections, several chemicals should be plotted on the map, such as persulfate, sulfate, pH, and redox potential and specific conductivity.
- B. To show the changes in concentrations over time, trend plots should be added for the selected chemicals. An example for persulfate in one well is attached.

The attached Figures 6-10 include trend plots for persulfate (as measured in the field using test kits), sulfate (as measured in a fixed laboratory), pH (as measured in the field using a multi-parameter probe that measured temperature, pH, and conductivity), oxidation-reduction-potential (as measured in the field), and 1,4-dioxane are plotted on a map to visually illustrate the effect of injections areally over time. Specific conductivity measurements did not show a significant response other than in the injection well and are therefore not presented on the figure.

- C. Is there an indication of whether the decline in persulfate is due to reaction with the VOCs or other processes such as advection, reaction with soil demand, etc.?

In Situ Chemical Oxidation is a non-specific technology that oxidizes all available compounds, not simply the contaminants of concern. The natural oxidant demand (the amount of oxidant that will be consumed by naturally occurring reduced species in the soils and groundwater (NOD)) was therefore an important design consideration and dosing was adjusted to accommodate the NOD as estimated in bench-scale tests (Operable Unit 3 Feasibility Study Phase 1 Treatability Studies report, Golder, 2011). It is therefore anticipated that activated persulfate was consumed by NOD, but significant decreases in 1,4-dioxane concentrations indicate that activated persulfate was also consumed through oxidation of contaminants of concern. Results from this pilot test indicate that the bench-scale estimates of NOD were appropriately scaled to field conditions. Furthermore, the apparent lack of mobility of 1,4-dioxane in this area indicates that groundwater flow velocity is slow and advection would account for little loss of persulfate.

- D. Note that injection wells are not good indicators of how the treatment is working throughout the aquifer. We fully expect the treatment to work completely in and very close to a well where the reactive chemicals are added directly.

Comment noted. Treatment was, as expected, approximately 99.8 % effective in the injection well, where the activated persulfate was added directly. Treatment was approximately 50% effective in monitoring wells MP16-1 and MP16-2 located 9.7 and 20.2 feet away, respectively, from the injection well.

E) Section 4.0, pages 8 to 9 - The text suggests that bioremediation could also be effective. Did the studies referenced in the text have similar geochemical conditions to the SCP site? What are the ideal conditions for biodegradation of 1,4-dioxane?

The studies referenced had promising bench scale results for samples collected under similar geochemical conditions to the SCP site. Field pilot testing at this site is now underway and includes the

introduction of oxygen, nutrients, and alkane gases to develop the necessary aerobic conditions to promote biodegradation of 1,4-dioxane.

P. Stephen Finn, C. Eng.

Principal

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Please consider the environment before printing this email.

From: Yeh, Alice <Yeh.Alice@epa.gov>

Sent: Monday, September 10, 2018 5:11 PM

To: Finn, Steve <steve_finn@golder.com>

Cc: Lin, Heather <heather_lin@golder.com>; Illes, Robert <robert_illes@golder.com>

Subject: EPA Comments on SCP OU3 ISCO Pilot Test Report

Following are EPA Region 2's comments on the draft In-Situ Chemical Oxidation Pilot Test report, Revision 0, dated August 2018. Please let me know if you have any questions.

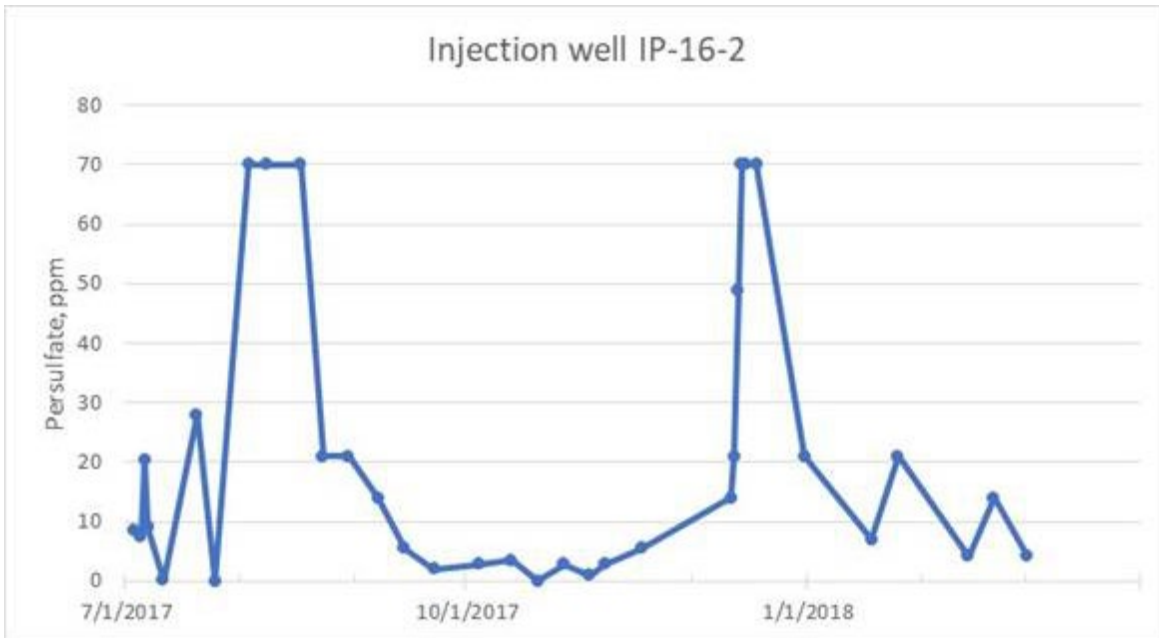
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C) Is there an indication of whether the decline in persulfate is due to reaction with the VOCs or other processes such as advection, reaction with soil demand, etc.?

D) Note that injection wells are not good indicators of how the treatment is working throughout the aquifer. We fully expect the treatment to work fairly completely in and very close to a well where the reactive chemicals are added directly.

E) Section 4.0, pages 8 to 9 - The text suggests that bioremediation could also be effective. Did the studies referenced in the text have similar geochemical conditions to the SCP site? What are the ideal conditions for biodegradation of 1,4-dioxane?



- Note the maximum detection limit for this method is 70 ppm.